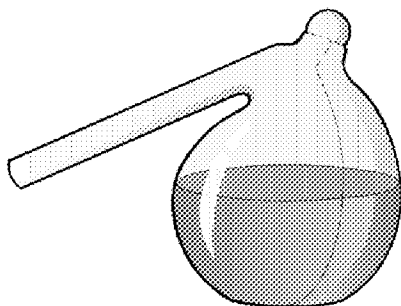


CHEMICAL SAFETY in the LABORATORY



DPH Laboratory Safety – October 2004



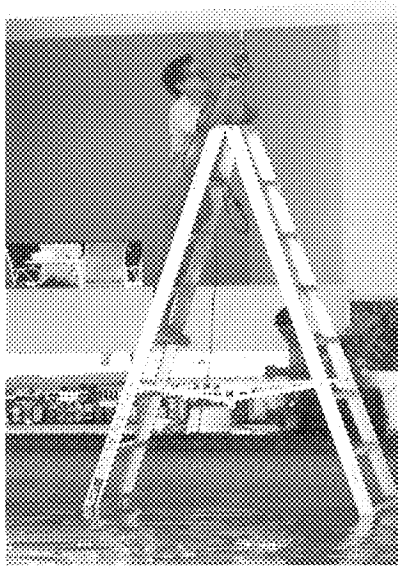
At the outset you should know that chemicals are neither good or bad, but they are tools that we use to make products that improve our daily lives. Some chemicals have properties that make them particularly useful for us, but these same properties make these chemicals hazardous. We have the ability to control these hazards if we follow certain prudent practices. Having a strong knowledge in chemical safety is extremely important since virtually every laboratory uses chemicals in some way. However, it is not unusual to find some laboratory workers, particularly the inexperienced, who are not well versed in chemical safety. We will discuss basic chemical safety principles, general laboratory practices, and provide some specific information about certain classes of hazardous chemicals.

Chemical Safety

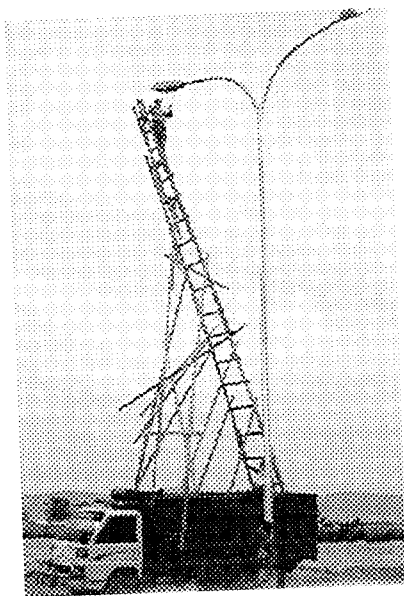
- Recognizing chemical hazards
- Measures to protect from exposure
 - *PPE*
 - *Handling*
 - *Engineering Controls*
 - *Storage*
- Chemical Waste Management
- Emergency plans

Training your employees is critical to meet the requirement, but whether there is a requirement or not, it is good business to train your employees in prudent safe practices to prevent exposures.

Workplace Safety



Workplace Safety



Chemical Hazards

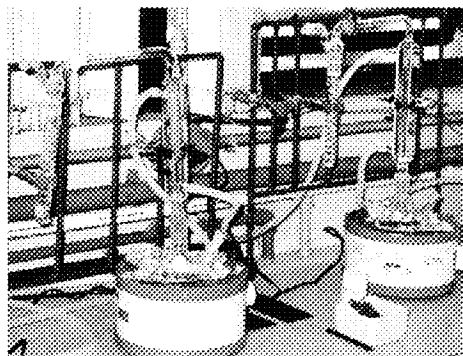
- Explosive when dry.
- Risk of explosion by shock, friction, fire or other sources of ignition.
- Extreme risk of explosion by shock, friction, fire or other sources of ignition.
- Forms very sensitive explosive metallic compounds.
- Heating may cause an explosion.
- Explosive with or without contact with air.
- May cause fire.
- Contact with combustible material may cause fire.
- Explosive when mixed with combustible material.
- Flammable
- Highly flammable.
- Extremely flammable.
- Extremely flammable liquid(gas.)
- Reacts violently with water.
- Contact with water liberates highly flammable gases.
- Explosive when mixed with oxidizing substances.
- Spontaneously flammable in air.
- In use, may form flammable/explosive vapour-air mixture.
- May form explosive peroxides.
- Harmful by inhalation.
- Harmful in contact with skin.
- Harmful if swallowed.
- Toxic by inhalation.
- Toxic in contact with skin.
- Toxic if swallowed.
- Very toxic by inhalation.
- Very toxic in contact with skin.
- Very toxic if swallowed.
- May impair fertility.
- May cause harm to the unborn child.
- Possible risk of impaired fertility.
- Possible risk of harm to the unborn child.
- May cause harm to breastfed babies.
- Contact with water liberates toxic gases.
- Can become highly flammable in use.
- Contact with acids liberates toxic gas.
- Contact with acids liberates very toxic gas.
- Danger of cumulative effects.
- Causes burns.
- Causes severe burns.
- Irritating to eyes.
- Irritating to respiratory system.
- Irritating to skin.
- Danger of very serious irreversible effects.
- Possible risks of irreversible effects.
- Risk of serious damage to eyes.
- May cause sensitization by inhalation.
- May cause sensitization by skin contact.
- Risk of explosion if heated under confinement.
- May cause cancer.
- May cause heritable genetic damage.
- May cause birth defects.)
- Danger of serious damage to health by prolonged exposure.
- May cause cancer by inhalation.
- Very toxic to aquatic organisms.
- Toxic to aquatic organisms.
- Harmful to aquatic organisms.
- May cause long-term adverse effects in the aquatic environment.
- Toxic to flora.
- Toxic to fauna.
- Toxic to soil organisms.
- Toxic to bees.
- May cause long-term adverse effects in the environment.
- Dangerous for the ozone layer.

Principles of Chemical Safety

General Rules

Know the Hazard

- **Physical**
 - *Explosive*
 - *Flammable*
 - *Reactive*
 - *Steam*
 - *Ergonomics*
- **Health**
 - *Toxic*
 - *Corrosive*
 - *Irritant/sensitizer*

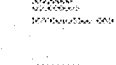


You should always know the hazards of the compounds you are using. Remember that a chemical may have more than one hazardous property. Do not depend on someone else to inform you about the hazards of the chemical you are using. You should find out for yourself. Nevertheless, always use prudent practices with chemicals to minimize exposures since we may not know all of the hazardous properties of a chemical, particularly long-term hazards like cancer. These hazardous properties generally fall into two hazard classes, physical and health.

Principles of Chemical Safety

MSDS (Material Safety Data Sheet)

<http://hazard.com>

Mallinckrodt Material Safety Data		
ACRYLAMIDE		
PRODUCT IDENTIFICATION		
Product Name: ACRYLAMIDE		
Product Code: 00000000000000000000		
Product Weight: 100g		
Product Volume: 100ml		
Product Purity: 99.99%		
Product Form: Solid		
Product Color: White		
Product Odor: Odorless		
Product Taste: Bitter		
Product Appearance: Crystalline		
Product Consistency: Solid		
Product Solubility: Soluble in water		
Product Stability: Stable		
Product Shelf Life: 24 months		
Product Storage: Store in a cool, dry place		
Product Handling: Handle with care		
Product Disposal: Dispose of in a safe manner		
Product Safety: Use with caution		
Product Information: For more information, visit our website		
Product Contact: Contact our sales department		
Product Address: 1234 Main Street, Anytown, USA		
Product Phone: (123) 456-7890		
Product Fax: (123) 456-7891		
Product Email: info@hazard.com		
Product Website: http://hazard.com		
Product Logo: 		
Product Barcode: 00000000000000000000		
Product Date: 00000000		
Product Version: 00000000		
Product Revision: 00000000		
Product Status: Active		
Product Type: Chemical		
Product Category: Organic		
Product Subcategory: Amide		
Product Group: ACRYLAMIDE		

Principles of Chemical Safety

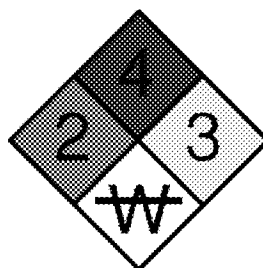
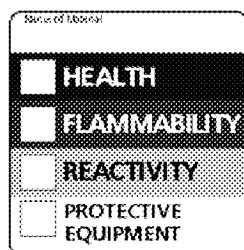
MSDS (Material Safety Data Sheet)

- **Chemical ID #**
- **Physical hazards**
- **Physical/chemical characteristics**
- **Reactivity**
- **Health hazards**
- **Controls - PPE, hygiene, engineering**
- **Emergency response**

The Material Safety Data Sheet or MSDS as it is commonly known is provided by the manufacturer of each chemical. It provides important safety information about the chemical you will be using. You should be familiar with the MSDSs of all of the chemicals you will handle. One shortcoming of some MSDSs is that the information given is often broad in scope and doesn't provide the specific information that you need. For example it is common for an MSDS to report that protective gloves should be worn, but the specific gloves are not given. Thus you will have to get that information from another source, such as your supervisor, the manufacturer, a reference book, or your safety officer.

Principles of Chemical Safety

Know the Hazard - Labels



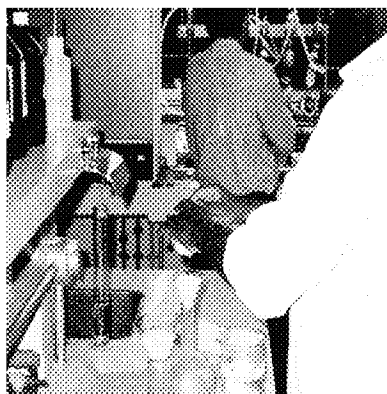
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Principles of Chemical Safety

General Rules

Know Route of Exposure

- **Contact**
 - *Skin*
 - *Wound*
 - *Eyes*
 - *Mouth*
- **Ingestion**
- **Inhalation**
- **Injection**



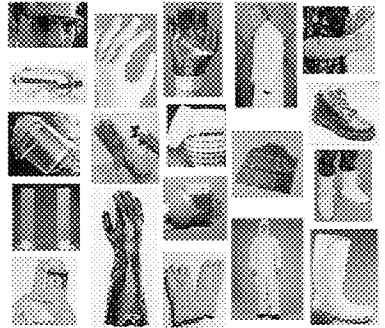
A basic tenant of toxicology is that for a chemical to affect us, it must enter our body through an exposure route, i.e. through direct contact with the skin, a wound or portal in the skin, the eyes, or through ingestion or inhalation. Our goal then to protect ourselves and others is to prevent the chemical from getting to that route of exposure. We can do simply by: 1) not allowing the chemical to come in contact with our skin, i.e. wearing protective clothing and gloves; 2) wearing protective eye wear or face shields; 3) not allowing any chemical to enter our mouth by prohibiting consumption or use of food, beverages, cosmetics, or medicines in the laboratory; 4) using ventilation or other control devices to contain chemical vapors, fumes, or aerosols. While accidental injection of a toxic compound could be considered a risk, this risk is small except for extremely toxic chemicals. In the latter case, the use of sharps, including needles, should be avoided or carefully evaluated to minimize any potential exposure.

Principles of Chemical Safety

Personal Protective Equipment

Personal Protective Equipment (PPE)

- Eye protection
- Hand protection
- Clothing protection
- Respiratory protection



We should always seem to contain our chemicals using appropriate containment devices like chemical fume hoods or ventilated enclosures, but it is also prudent to combine this with the use of appropriate PPE.

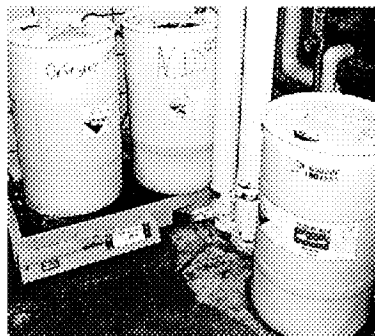
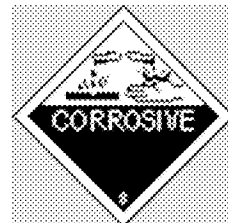
Personal Protective Equipment (PPE)



Principles of Chemical Safety

Corrosives

- Strong Acids
- Strong Bases/Alkalies
 - Most dangerous:*
 - Destroys tissues rapidly*
 - Eyes very sensitive, may be damaged in 15 seconds*
- PPE for skin, eyes
- Emergency eye wash/shower
- Storage

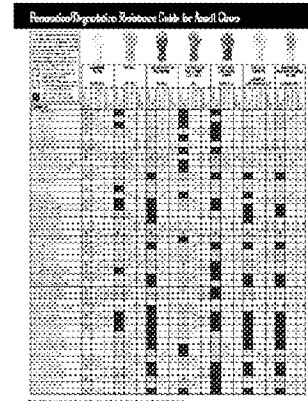
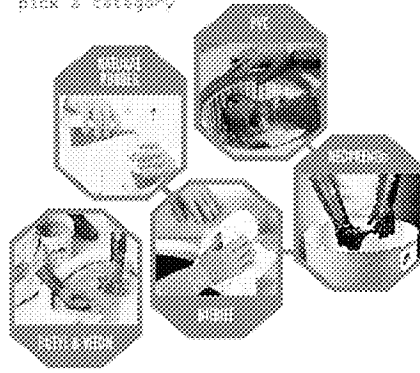


Corrosives are chemicals that you are likely to encounter in the laboratory, usually in the form of strong acids or strong bases. Corrosives can be very dangerous and can cause severe injury. It is critically important that you wear the proper personal protective equipment, i.e. safety glasses or goggles, protective gloves and a lab coat. Pay attention to storing corrosives since many are not compatible with each other. You should always be prepared to handle emergencies like spills.

Personal Protective Equipment (PPE)

Hand protection

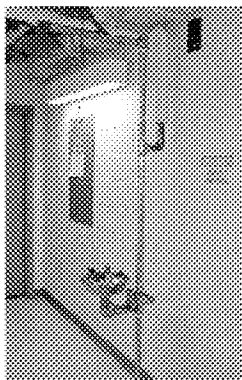
for more information
pick a category



Principles of Chemical Safety

Hazardous Chemicals

Corrosives



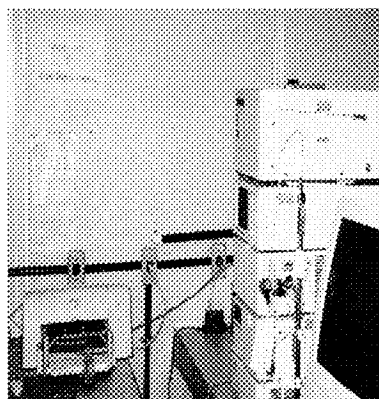
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Principles of Chemical Safety

Hazardous Chemicals

Toxic Chemicals

- *Know your chemicals*
- **Minimize exposures**
 - *Ventilation, fume hoods*
 - *PPE (specific)*

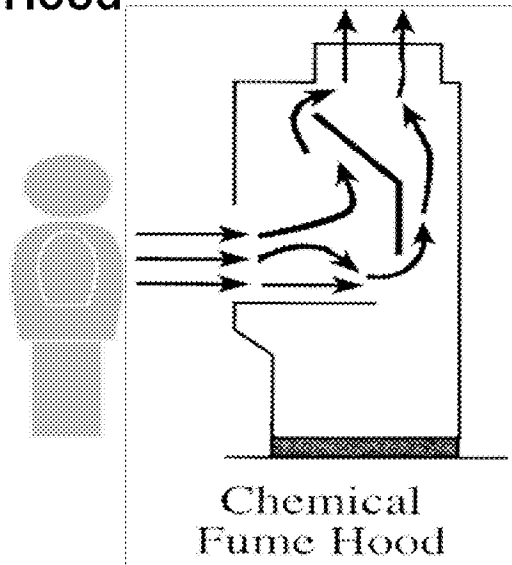


Many chemicals have known toxic properties. You need to know the toxic properties of those chemicals you are using. However keep in mind that the majority of known chemicals have never been tested and those that have been tested have only been evaluated up to a certain point. The importance of this is that you should never allow yourself to be exposed to a chemical. It may have unknown or unrecognized toxic properties that might only be discovered by accidental exposure to a person. The Rule: Minimize exposures to chemicals. This is done as has already been pointed out by use of control devices like ventilation and PPE. It is worth noting here that unlike biological contamination that can be decontaminated with appropriate biocides, chemical contamination is often difficult or impossible to remove. The best strategy is to try to prevent the contamination at the start.

Principles of Chemical Safety

Chemical Fume Hood

Proper Usage



Chemical fume hoods are vital to your protection from chemicals that can be inhaled or breathed. Chemical operations that involve vapors, aerosol or fume production should be carried out in a chemical fume hood or in some other ventilated enclosure. Basically the hood draws in air, usually at around 100 feet per minute. Lower velocities may not capture vapors or particles but very high velocities create turbulents that can decrease the effectiveness of the hood. As the diagram shows air is drawn into the hood through the open space below the sash. Air sweeps across the floor of the hood and out a lower exhaust vent to pick up vapors that are heavier than air, and air also sweeps upward through a top exhaust vent to pick more volatile vapors that are lighter than air. Both exhaust vents are important. You will note that if you place a lot of containers or equipment on the floor of the hood that you will obstruct the exhaust of vapors. This is why it is important that you not store materials in a hood. You should learn more about hoods because there are other factors that can affect performance, and thus change the degree of protection you receive.

Principles of Chemical Safety

Chemical Fume Hoods

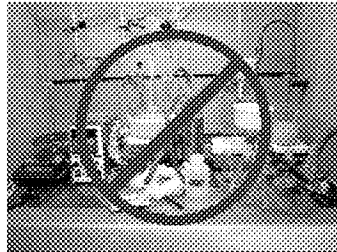
- Work inside > 6 inches
- Keep sash at certification point or lower
- Avoid storage
- Limit activity in area when working at hood
- Limit arm movements



Here are few tips about using a hood. Your hood must be evaluated at least on an annual basis to ensure that it is providing the protection needed. Most new hoods have gauges to let you know if they are working. Be sure to check your hood out to make sure it is working before you start any work. Some people use small strips of tissue taped to the bottom of the sash as “telltales” of whether there is active exhaust. While this is good for a rough check, you should always remember that it is not as reliable as an active gauge that measures velocity or exhaust volume. When using a hood, you should always try to work at least 6 inches inside from the front to get the maximum capture of your emissions. Working on the front edge may allow some chemical to escape and expose you or someone else. Additionally beware that people walking behind you can easily generate turbulents that can pull chemical emissions, that are on the front edge, back into the room. As indicated earlier, you should try to minimize the storage of materials in the hood since they disturb the flow of exhaust.

Standard Laboratory Practices

Chemical Fume Hoods



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Standard Laboratory Practices

Hazardous Chemicals

Flammables

- Fire, explosion - *most dangerous & expensive* of accidents
- Reduce risk
 - *Minimize quantities*
 - *Ventilation, fume hoods*
 - *No Ignition sources*
 - *Store in flammable cabinets, chemical safe refrigerators*
 - *Know emergency procedures*

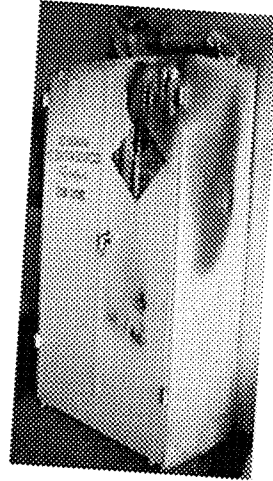
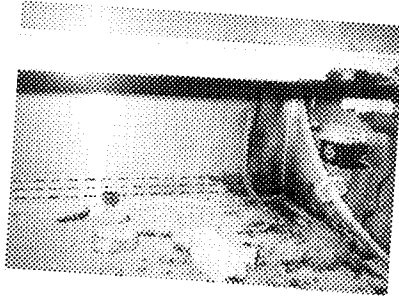


Of all of the accidents that can happen, fires and explosives are the most dangerous and most expensive. Particular attention should be given to the use of flammable chemicals. Minimizing the quantities of the chemicals is a principal way to reduce your risk. Think of it in the reverse, i.e. the larger the quantity of a hazardous chemical you are using the greater the risk. Other ways to reduce the risk of fire and explosion are to use hoods or ventilation to remove the vapors of flammables, ensure there are no sources of ignition, and to store chemicals in certified flammable storage cabinets or in refrigerators that are certified for chemical storage.

Standard Laboratory Practices

Hazardous Chemicals

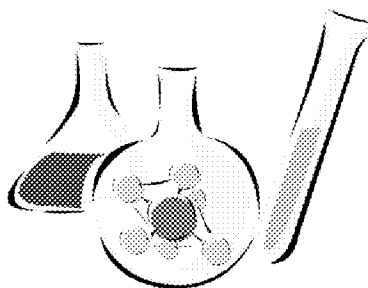
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Principles of Chemical Safety

Chemical Storage



In this section I am going to address chemical storage guidelines. Proper chemical storage is an essential part of every chemical safety program. It is often the improper storage that causes us the biggest headaches and presents the biggest hazards. Have any of you had to call the “bomb” squad because of an improper maintained storage area was found to contain a very dangerous peroxide former?

Chemical Storage

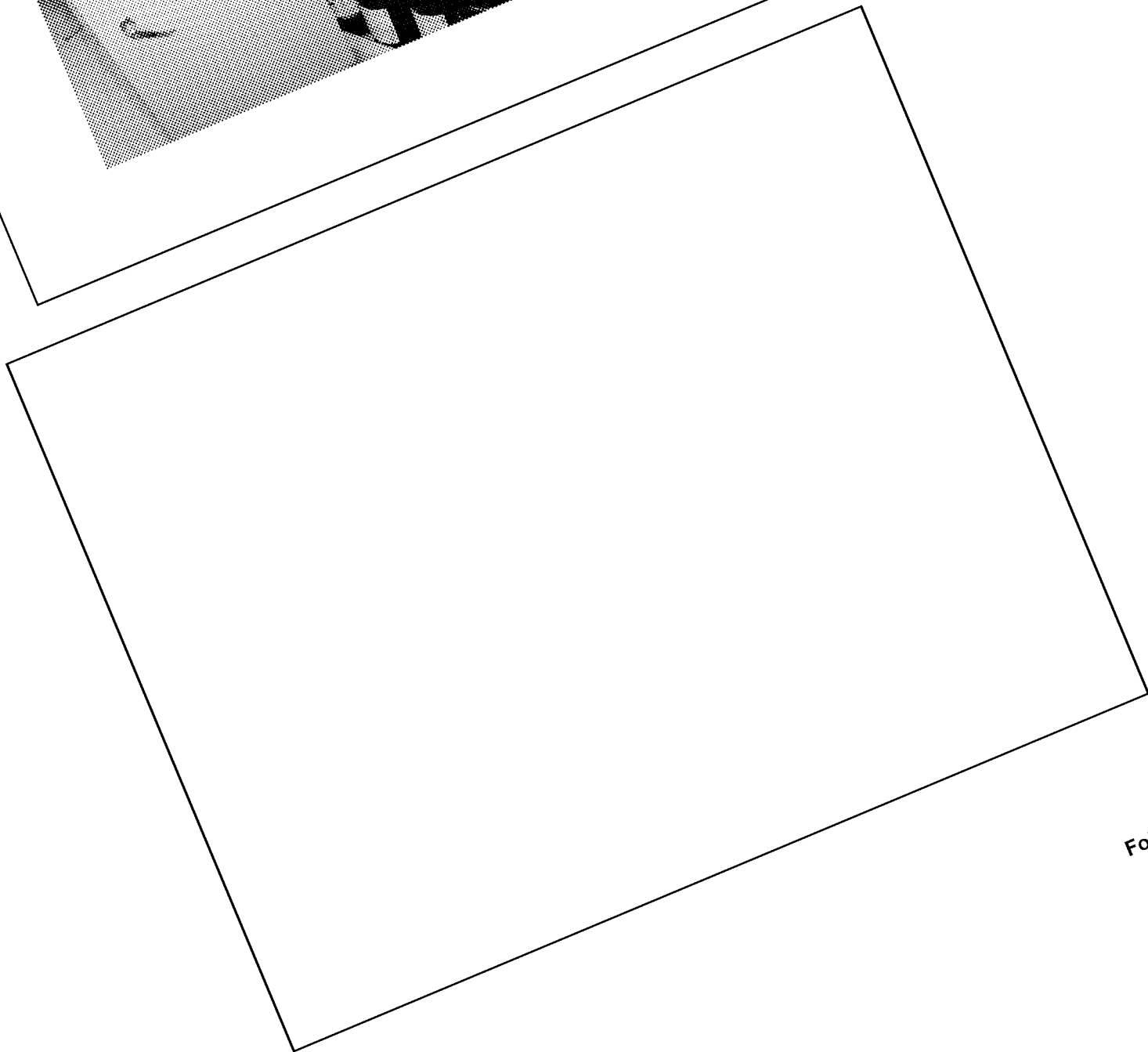
- **Separate into compatible groups**
 - *Then store alphabetically*
- **Store in appropriate cabinets**
 - *Flammables only in approved cabinets*
 - *Flammable in laboratory-safe refrigerators*
 - *Acids, bases, oxidizers in separate cabinets*

Some general rules for storage are given here.

Chemical Storage

- **Know hazards of chemicals**
- **Watch for & separate incompatibles**
- **Reduce amount of chemical**
- **Discard chemicals on schedule**

It is always good practice to routinely reduce the amounts of chemicals on a periodic basis. Many chemicals become aged, begin to degrade, and some even become more hazardous upon continuous storage. Dating containers where they are received and opened is prudent practice. You should always know your inventory and periodically, at least annually, review it for potentially dangerous chemicals that need to be discarded (disposed of).







Personal Exposure

Clothing

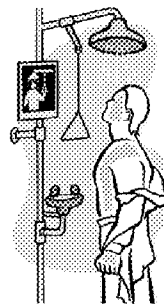
- Use safety shower
- Quickly remove contaminated clothing, shoes, jewelry

Eyes

- Immediately flush w/ water for 15 min
- Hold or assist in holding eye lids open

Skin

- Flush immediately w/ flowing water > 15 min
- Wash w/ warm water & soap if no burn visible
- Check MSDS/other information for delayed effects



A chemical exposure or splash on your clothing could be serious if the chemical is hazardous. The chemical needs to be removed from contact with your skin immediately. A safety shower can provide a fast way to remove the chemical. Removal of the contaminated clothing is critical. Don't forget jewelry since chemical may become trapped under it and cause more damage. There are many stories where modest people refused to remove the contaminated clothing and this resulted in making the injury more severe.

Principles of Chemical Safety

General Rules

- **Minimize all chemical exposures**
- **Use ventilation & engineering controls**
- **Use Personal Protective Equipment (PPE)**
- **Know your chemicals & inventory**



Here some of the basic principles of chemical safety. If you follow these all of the time, every time, you will protect yourself and others from harm. That being said, it requires that you hold safety as a critical basic value. That is, you will always consider safety in all that you do. You should have a strong "safety ethic"! I will talk more about each of these. Minimize all chemical exposures by using control devices such as ventilation, personal protective equipment (PPE), or prudent practices. You must know the hazardous properties of the chemicals you use. You must plan ahead thinking of your and others safety. Remembering Dr. Wetterhahn, you should never underestimate the risks from the chemicals you are using. Lastly, you must be prepared to handle emergencies because if you work in the laboratory long enough, you will have an emergency or incident that requires you to act rapidly.

Principles of Chemical Safety

General Rules

Practice good housekeeping

- Clean up after each experiment
- Don't store materials on work surfaces
- Keep aisles clear
- Keep chemicals in storage cabinets
- Purge work areas of unnecessary or unused equipment, supplies, chemicals

It is critically important to your safety to maintain good housekeeping. Anecdotally poor housekeeping has been reported to be an important contributor to incidents and accidents. The National Research Council's *Prudent Practices in the Laboratory* reports that there is a definite correlation between orderliness and level of safety in the laboratory, and additionally a disorderly laboratory can hinder or endanger emergency response personnel. Make good housekeeping an everyday part of your work activities.

Principles of Chemical Safety

General

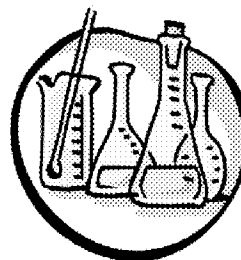
- **Prohibit mouth pipetting**
- **Store chemicals according to compatibilities**
- **Maintain chemical inventories and ensure they are available and accessible**
- **Label and date all chemical containers after opening. Dispose of outdated and obsolete chemicals**
- **Secure compressed gas cylinders**

Thank goodness mouth pipetting has been outlawed from labs many years ago. Nevertheless, occasionally, we hear about someone doing this. It is an unsafe practice and must not be allowed. Chemicals are one of the mainstays of laboratories. It is critical that we all know about the properties of the chemicals we use and store. Proper storage plays an equally important role in safety.

Principles of Chemical Safety

Summary

- **Know your chemicals & inventory**
- **Apply good work practices**
- **Apply good housekeeping practices**
- **Plan ahead**
- **Never underestimate risks**
- **Prepare for emergencies**



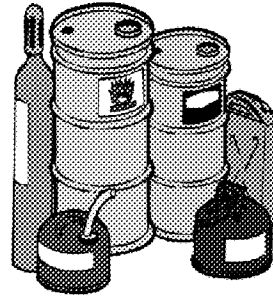
These are the basic principles of chemical safety. Follow these prudent practices and you will be safe, and you will also protect others around you.

Hazardous Waste Management



Objectives

- Know your responsibilities as hazardous waste generators
- Know how to:
 - *Identify*
 - *Label*
 - *Accumulate*
 - *Store*
 - *Dispose*
- Know how to respond to a chemical spill



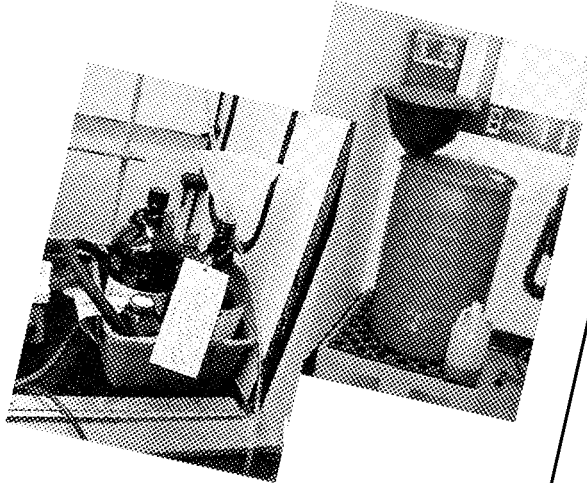


Responsibilities

- The lab/area supervisor and designated secondary contact person are directly responsible for the proper management of hazardous waste generated in their area.
- Lab/area personnel must comply with procedures regulating the proper management of hazardous waste.
- The EHS Department will enforce applicable federal and state hazardous waste management regulations.
- Fines are the responsibility of the Department receiving them.

Past Deficiencies

- Containers not closed
- Improper labeling or NO LABEL
- Improper storage/segregation of hazardous waste
- Lack of secondary containment



Do you see deficiencies in hazardous waste management in your lab/area?

Hazardous Waste Management

- Designed to meet compliance with Federal and State hazardous waste regulations.
- “Cradle-to-Grave” responsibility – we are still responsible for the waste once it leaves the facility.
- Important hazardous waste management requirements for personnel to comply with include:
 - *Identifying Waste*
 - *Labeling Waste*
 - *Accumulating Waste*
 - *Storing Waste (Closed, Contained, Compatible)*
 - *Disposing Waste*

Sanitary Sewer Requirements

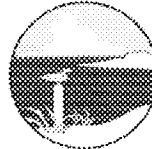
**Never pour hazardous waste
down the sink!**

- Against the Law
- Potentially damaging to the environment
- Can put building maintenance personnel at risk

Waste Water Alert!

To meet MSRA requirements, we must treat wastewater.

We are asking for following materials to be written
the wastewater through our sewer system:



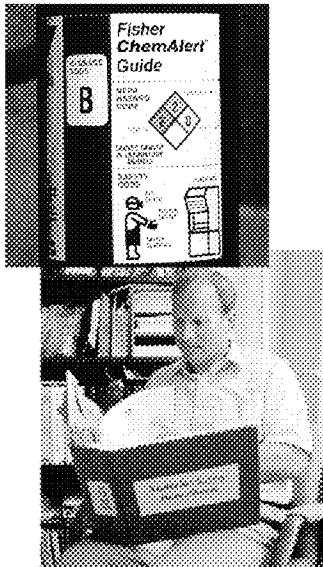
Strong Acids and Bases
(Solutions with pH < 5.5 or > 12.0)

Mercury and other Heavy Metals
(A.k.a. Mercury-containing materials)

Volatile Organic Compounds
(Common Laboratory Solvents)

Download our free Waste Management Handbook for more details
on prohibited materials at www.mhhs.org/water

Identifying



- Check the Material Safety Data Sheet to help determine if your chemical waste is a hazardous waste.
- Check the original container label for hazard information.
- If you have a mix waste, know the makeup of the chemical constituents and percents to determine if it is a hazardous waste and which hazard category(s).

Labeling

- All containers must have a “Hazardous Waste” label.
- For process equipment waste, apply the white label.
 - *Process equipment waste must be emptied DAILY to a waste container located in the Satellite Accumulation Area (SAA).*



Labeling

Fill in Room & Pic #

List the major chemical constituent(s) and their percent(s) making up the waste.

Check one of these boxes.

Determine the hazard category(s) based on the chemical constituents & percents or the manufacturer label if it is a pure substance.

HAZARDOUS WASTE

Room# Pic# Start Date
 End Date
 Solid or Liquid

Caution: Read Label, Please Print Clearly.
 Do not use abbreviations or formulas.

☐ Solid ☐ Liquid ☐ Gas

Hazard Category:

☐ Corrosive g/L
☐ Flammable g/L
☐ Irritant g/L
☐ Oxidizing g/L
☐ Toxic g/L
☐ Volatile g/L
☐ Other: g/L

Enter amount next to unit.

Labeling

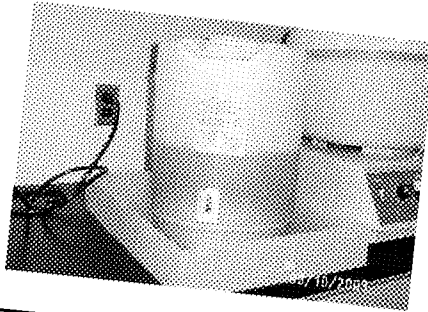
- List each **chemical compound** and its corresponding **percentage** by volume or weight.
- Use full chemical name(s).
DO NOT USE abbreviations or formulas!
- Content of information needs to be accurate for proper hazardous waste disposal.
- If not correct, EHS will contact the Primary Contact Person for further information until resolved.

HAZARDOUS WASTE			
Record#	Flask	Short Desc	Location
		Inventory list	
1 Liquid Nitrogen, Nitrogen Liquid Storage General Development/Production in Process			
<input type="checkbox"/> Solid <input type="checkbox"/> Liquid <input type="checkbox"/> Gas			
UNCLASIFIED HAZARDOUS			2000
<input type="checkbox"/> Gas	Inventory		2000
<input type="checkbox"/> Liquid	Inventory		2000
<input type="checkbox"/> Gas	Inventory		2000
<input type="checkbox"/> Solid			2000
<input type="checkbox"/> Solid	Inventory		2000
<input type="checkbox"/> Gas	Inventory		2000
<input type="checkbox"/> Liquid	Inventory		2000
<input type="checkbox"/> Solid	Inventory		2000
<input type="checkbox"/> Gas	Inventory		2000
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<input type="checkbox"/> Solid	Inventory		2000
<input type="checkbox"/> Gas	Inventory		2000
<input type="checkbox"/> Liquid	Inventory		2000
<input type="checkbox"/> Solid	Inventory</		

Accumulating

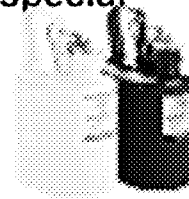
For most liquid waste:

- Use glass or polyethylene containers
- EHS provides 5-gallon polyethylene containers for frequent generators as well as 30-gallon poly drums.
- Container must be compatible with waste

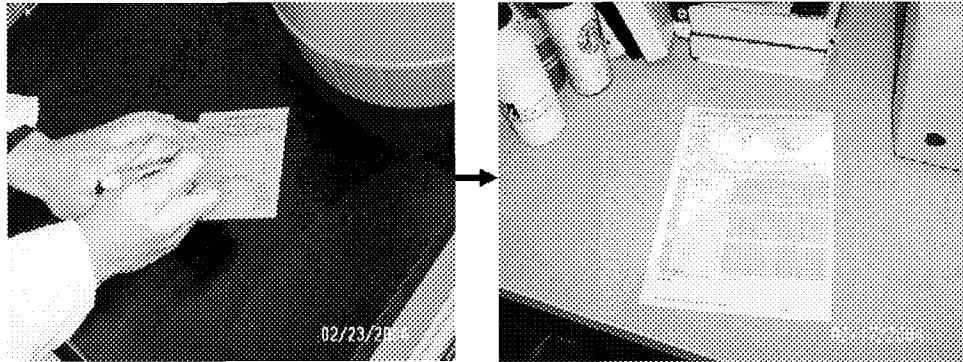


Accumulating

- You should have no more than ONE container of each kind of waste.
- Place a “Hazardous Waste” label on the container at the point of depositing the waste.
- When waste container is full, fill out a Hazardous Waste Pickup Sheet and contact EHS.
- Let EHS know about concerns or special waste handling needs.



Accumulating



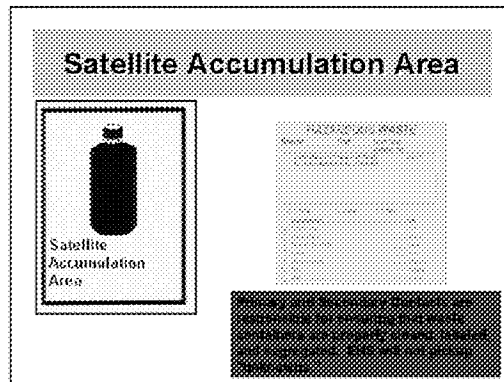
Storing

- Waste must be stored and segregated in a designated SAA.
- SAA must be labeled and identified and at or near the point of generation.
- Secondary containment (totes, trays,) must be used.
- Containers must remain capped/closed when not collecting waste.



Storing

- Signs have been posted in labs/areas where a SAA is designated for the collection of hazardous waste.



Storing



Keep hazardous waste containers closed except when adding waste.

Unknown Waste

- Unknowns should not occur in your area because you always label everything!
- Unknowns cost more to dispose!
- The main Hazardous Waste Accumulation Area is not setup to store Unknowns!



Unknowns are chemicals in containers where the labels have been lost or the name of the chemical on the label is obliterated.

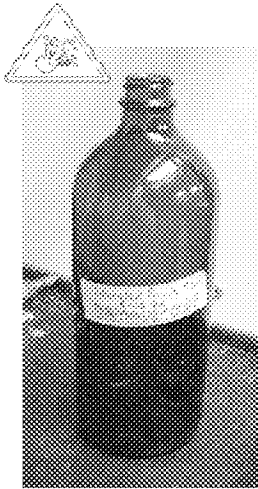
Peroxide Formers



- Keep these items separate from other hazardous wastes.
 - *Shock & heat sensitive!*
 - *Explosive hazard!!*
- Do not mix these items with other wastes.

Chemicals that are highly toxic, are known to cause cancer or birth defects, have very low Permissible Exposure Limits, are highly reactive, or react vigorously with common materials, with water, or with air should all be considered highly hazardous materials. Chemicals which are under pressure, or can build up pressure, can auto-ignite at familiar temperatures, which burn vigorously and energetically, or which, when burning, can't be extinguished with conventional methods should be considered highly hazardous.

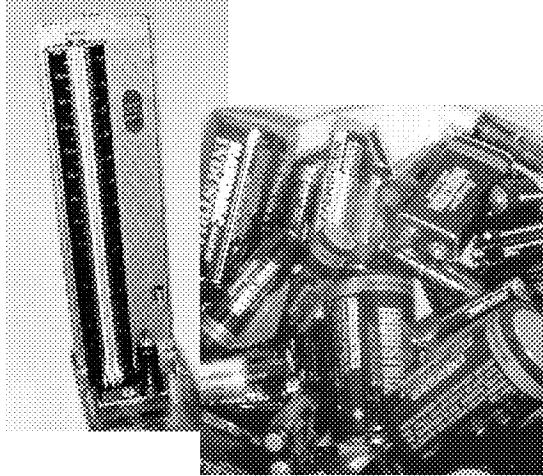
Peroxide Formers



- Do not store longer than necessary (expensive disposal cost).
 - *Date container*
 - *Discard 3 months after opening*
 - Isopropyl ether
 - *Discard 12 months after opening*
 - Ethers: ethyl ether, tetrahydrofuran, dioxane
 - Aldehydes: acetaldehyde, acrolein, acetal
 - *Discard all unopened After 18 Months*

Chemicals that are highly toxic, are known to cause cancer or birth defects, have very low Permissible Exposure Limits, are highly reactive, or react vigorously with common materials, with water, or with air should all be considered highly hazardous materials. Chemicals which are under pressure, or can build up pressure, can auto-ignite at familiar temperatures, which burn vigorously and energetically, or which, when burning, can't be extinguished with conventional methods should be considered highly hazardous.

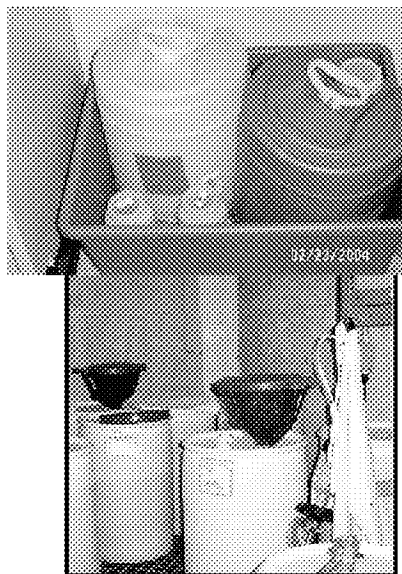
Mercury Thermometers & Batteries



- Collected and placed in separate plastic bags (NO BIOHAZ Bags).
- DO NOT NEED “Hazardous Waste” Label.

Disposing

- EHS picks up waste from SAAs and brings it to the main Hazardous Waste Accumulation Area.
- Waste is given a start date and can only be stored in the Hazardous Waste Accumulation Area for up to 90 days from the start date.



Examples of oxidizers that can be stored together.

Disposing



- Every two to three months, a chemical waste contractor picks up the waste from our main Hazardous Waste Accumulation Area and ships the waste to various disposal facilities in the US and Canada.

Disposing

- The chemical waste contractor segregates the waste into specific hazard categories.
- The specific hazard categories are then lab packed and placed into poly or metal drums or pails with vermiculite.



Examples of oxidizers that can be stored together.

Chemical Spill Response

Minor

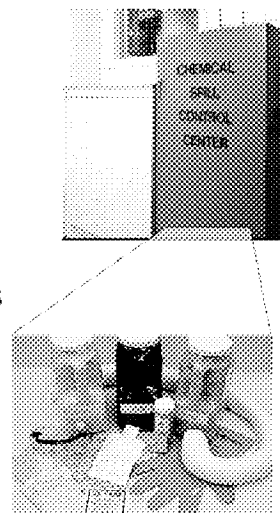
An incidental spill is one that you can handle on your own (or with the help of a coworker). **How do you know if you can handle the spill?**

- If you have experience or training in cleaning up this type of spill.
- If there is no exposure risk because it is a low toxicity chemical.
- If it's not so flammable that a fire could start.
- If it hasn't and won't go down the drain.
- If you have the right kind of spill cleanup materials.
- If you have the proper protective equipment: gloves, goggles, apron, face shield, etc).
- If no one has been injured or has chemical exposure.

Chemical Spill Response

Minor

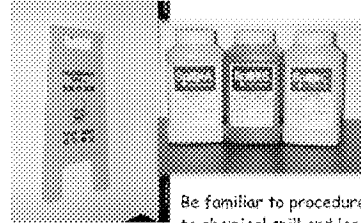
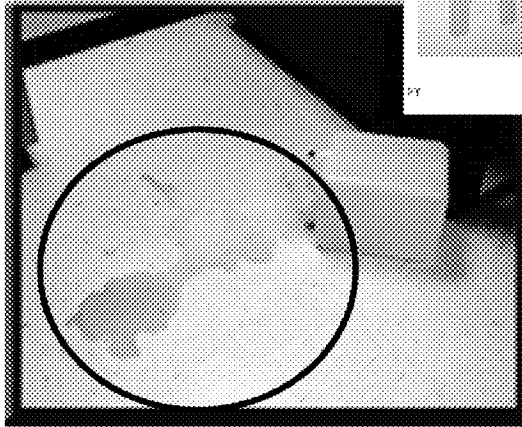
- Alert other people in the lab.
- Turn off all sources of ignition if safe to do so.
- Wear appropriate PPE.
- Use chemical absorbent pads to soak up small spills.
- Collect spill debris in appropriate container; label the spill materials following the hazardous waste procedures.
- Notify the EHS at x6213 or x6207 of a spill and arrange for a waste pickup within 3 days of the incident.



In the event of chemical spill you should always first notify the personnel in the immediate area. If you are unsure, always err on the side of safety and have personnel evacuate the area. Call your emergency response team for assistance in cleaning up the spill if it is other than a minor spill. You may want to call security to cordon off the area and direct emergency responders.

When to Perform Cleanup

- **Minor Spill**



Be familiar to procedures
to chemical spill and learn
how to clean up minor spill

Chemical Spill Response

Use neutralizers or absorbents:

Acids

- **Use acid neutralizers**

Caustics

- **Use caustic neutralizers**

Mercury

- **Use *Hg Absorb* sponges & powder**

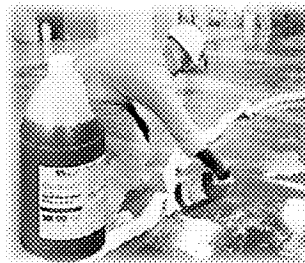
- **Use flask w/aspirator**

Solvents

- **Use solvent absorbents**

- **Remove all ignition sources**

- **Provide maximum ventilation**



There are several neutralizers available to treat acid spills. Acids are commonly found in many labs so it prudent to be prepared to deal with acid spills.

Chemical Spill Response

Major

1. **Causes personal injury or chemical exposure that requires medical attention;**
2. **Causes a fire hazard or uncontrollable volatility;**
3. **Requires a need for respiratory protection;**
4. **Involves or contaminates a public area;**
5. **Causes airborne contamination that requires local or building evacuation;**
6. **Causes damage to property that will require repairs;**
7. **Cannot be properly handled due to lack of training and/or equipment;**
8. **Requires prolonged or overnight cleanup;**
9. **Involves an unknown substance;**
10. **Enters the land or water**

Chemical Spill Response Major

- Alert people in the lab to evacuate area.
- Turn off all sources of ignition if it is safe to do so.
- Call internal help at x5911 to report:
 - *Chemical Name(s)*
 - *Approximate volume spilled*
 - *Location of the spill*
 - *Phone number to be reached*
 - *Employee(s) injured*

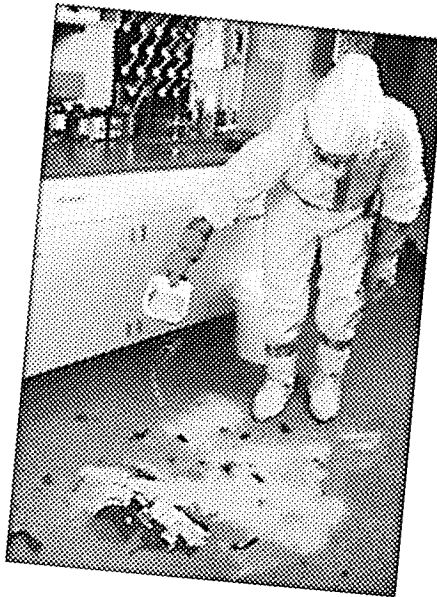
When to Perform Cleanup

- **Major Spill**

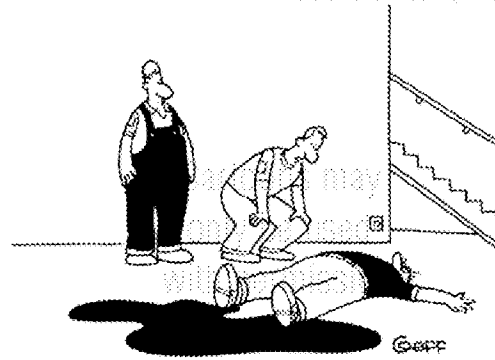


When to Perform Cleanup

- **Major Spill**



Any Questions?



"Sir, was that the spill you wanted
us to mop up so no one would slip?"